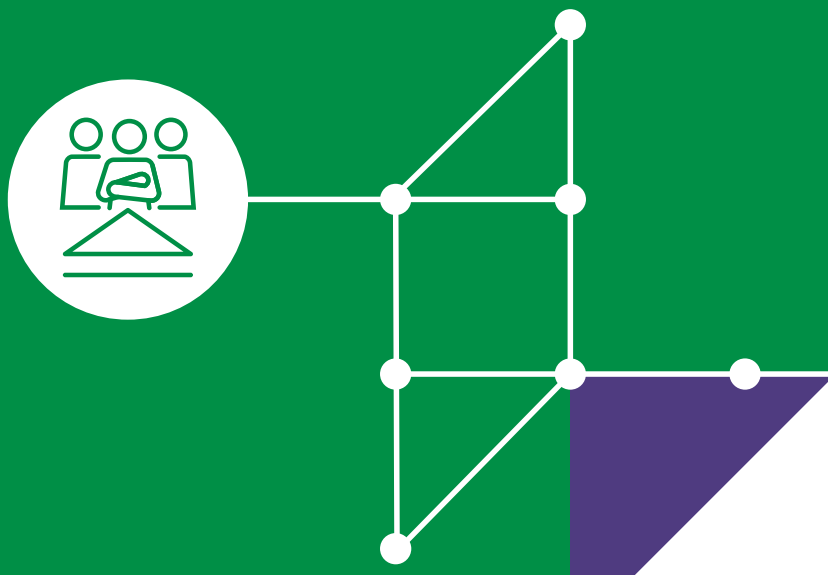
Manual

AI in Higher Education Field Lab

Professional Development Method for Lecturers in Higher Education



Acceleration plan
Educational innovation with ICT

Facilitating professional development of lecturers

Manual
AI in Higher Education Field Lab

Professional Development Method for Lecturers
in Higher Education

Acceleration Plan Educational Innovation with IT
Zone Facilitating professional development for lecturers
www.versnellingsplan.nl

Acceleration plan
Educational innovation
with ICT

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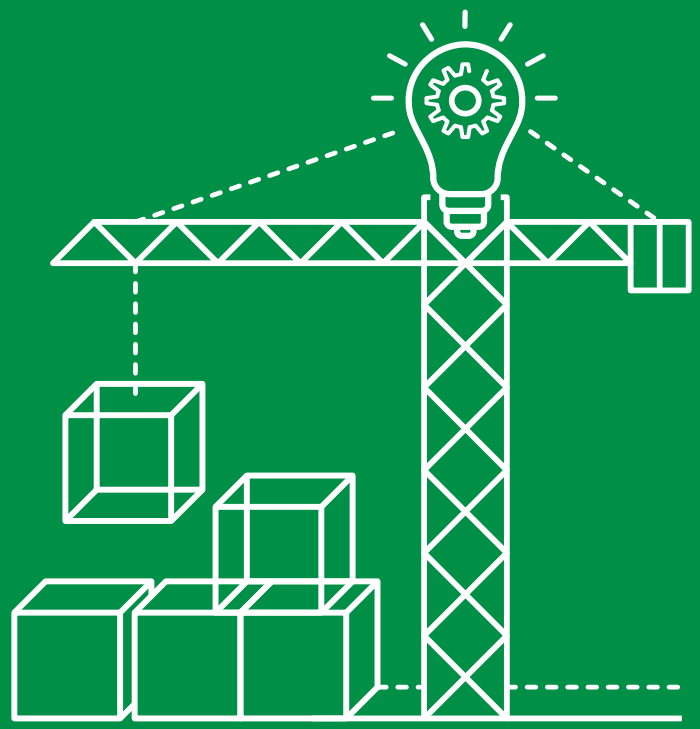
For the sake of readability, 'the lecturer' is used when referring to participants in this field lab. However, this can also be interpreted as the participant's role, such as 'the educational designer' or 'the IT employee'. The text also uses 'he' and 'his'. Where 'he' or 'his' is stated, one can also read 'she' or 'her'.

Contents



Background

The field lab ‘AI in higher education’ was created as part of the **SURF Acceleration Plan for Educational Innovation with IT**. The Acceleration Plan for Educational Innovation with IT is a process for developing the opportunities that the digital transformation offers higher education in the Netherlands. The mission of the Acceleration Plan is to create scope within a given institution – and in collaboration with other higher education institutions – to move the digital transformation of higher education in the Netherlands forward in a significant way. The Acceleration Plan is a collaboration between the Association of Universities, the Association of Universities of Applied Sciences, and SURF.

It is a four-year programme running from 2019 to 2022 and is based on three ambitions:

- To improve alignment with the labour market;
- To encourage more flexibility in education;
- To make better and smarter use of technology.

The **Facilitating professional development for lecturers zone** (“lecturer professional development” or “PD”) is working towards finding a way for institutions to assess the extent to which they effectively facilitate and provide PD for lecturers within their organisation in relation to educational innovation using IT. Institutions may then embark on a process of improvement based on a collection of proven and effective professional development strategies. This is because acceleration actually takes place within the institutions. It is for this reason that special attention is paid to specialists who support lecturers and managers.

The ‘Facilitating professional development for lecturers’ zone focuses on five themes at the sectoral level, institutional level and individual level, which can be represented in a pyramid model (see Figure 1). One of those themes is Field Labs for professional development.

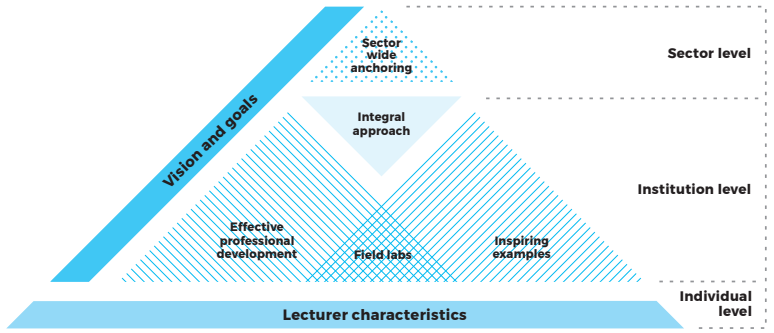


Figure 1 The pyramid model of the Facilitating Professional Development for Lecturers

For the **Field Labs**, the zone combines effective building blocks for lecturer professional development with solid substantive example of educational innovation using IT in various field labs (Figure 1). These field labs will be developed, described and tested in such a way that lecturers will be imbued with inspiration and information to start designing and teaching good (thoughtfully designed) lectures, making smart use of digital technology – but only if this benefits the teaching process.

Goal

Artificial Intelligence (AI) is a currently a very topical social theme. Rapid changes and far-reaching opportunities have ensured that there is a strong focus on the current and future applications of AI within various sectors, including education in general and higher education in particular. One use of AI is to ensure that teaching better meets the expectations of students and to increase the effectiveness of digital learning resources. Nevertheless, there is often still some ambiguity or uncertainty surrounding the topic of AI. What risks do the various AI applications entail?

The Netherlands AI Coalition acts as a catalyst for AI applications within the Netherlands. The 'AI in Education' SURF community also has the ambition to bring together and expand knowledge and understanding of artificial intelligence specifically in the higher education context. For this reason, the Acceleration Plan's Professional Development for Lecturers zone worked with them to develop this field lab. The aim of the field lab on AI in higher education is to enable lecturers to experience what AI is and what possible applications of AI there might be for their teaching practice. As long as you know what you are doing, you can mitigate any potential risks of AI applications.

This field lab provides a launchpad for taking the first steps in AI and from which you will be able to properly substantiate your decisions on the deployment of AI applications. This is done based on a preparation module and a hackathon on the topic. A detailed description of this hackathon and the associated preparation module can be found in the section on the practical design, page 13 ff. of this document. The substantive justification described on the following pages is one of the components of the preparation module.

Substantive justification

The term "artificial intelligence" (AI) was introduced in 1956 by the scientist John McCarthy. He defined AI as 'the science and engineering of making intelligent machines'. Over the following decades, interest in AI has seen both highs and lows. A new revival of AI came in 2011 with the development of deep learning technologies. Researchers such as Andrew Ng, Geoffrey Hinton, Yoshua Bengio and Yann LeCun gave a boost to the intelligence of algorithms. AI applications that had previously been considered impossible suddenly looked more feasible than ever. For example, IBM's Watson supercomputer beat his human opponents Ken Jennings and Brad Rutter, two participants who broke records in the television quiz Jeopardy!, by a wide margin, and Google learned to distinguish dogs and cats from each other thanks to our click habits. Google's AlphaGo also defeated world champion Lee Sedol in the Go game in 2016, while we had previously thought that the Go game could only be played at a high level with human intelligence (and intuition).

AI is making a significant advance in higher education worldwide. Higher education institutions have recorded measurable results when they implement AI[1]. This is why expectations about the role of AI are high, for example, with regard to the workload of lecturers, personalised learning, the effectiveness of digital learning resources and the generation of substantiated understanding of student performance[2]. Many successful prototypes have already been built. We now face the challenge of scaling up these prototypes and integrating them into institution-wide systems[3]. It is therefore important that we re-examine the current decision-making process. After all, new data, analyses, technologies and services that we obtain with AI will not be effective or sustainable if they are implemented according to traditional decision-making.

In this field lab, we will look at the practical possibilities that AI can offer in today's teaching practice. We focus on automating cognitive tasks in teaching, and specifically on its role in the classroom and its consequences for lecturers and students.

What is AI?

The amount of data available in society is growing enormously. This data, increasing computing power and academic breakthroughs are all helping drive strong growth in AI developments. There are now systems that can identify patterns in substantial amounts of data and that replicate human thinking and rational reasoning, such as generalising, arguing, interpreting and learning from the past[4,5]. People can use these systems to perform all kinds of tasks and these systems can even take over certain tasks.

With some AI technologies, the patterns in data are created in the same way that our brain cells (neurons) and neural networks communicate with each other. AI can be used for speech recognition, categorising images, language processing and for making adaptive decisions based on digital data and (real-time) data from sensors[6]. Examples that many people will know include Siri by Apple and Alexa by Amazon, assistants that can interact with the user. Consider also self-driving cars[7] and the use of AI in the diagnosis of certain diseases[8].

Two successful technologies in pattern recognition by AI are *machine learning* and *deep learning*. Machine learning is the part of AI that deals with the development of algorithms and technologies which can help computers learn. This might concern text, but may also be about images or speech. You feed the machine examples to allow it to discover the algorithm. Machine learning is divided into three main categories: supervised learning, unsupervised learning and reinforcement learning. In supervised learning, the AI application finds the algorithm that can be applied to new situations based on substantial amounts of human-labelled information. Consider, for example, photos of traffic, in which people, crossroads, cyclists, cars and so on have already been identified and labelled as such by people. With unsupervised learning, the AI application is fed with even larger amounts of data, which have not been categorised or classified. Reinforcement learning includes ongoing improvement of the model, based on feedback, making it the most powerful form of machine learning[9].

Deep learning is a part of machine learning and uses multi-layer neural networks. In deep learning, the AI application will teach itself what the distinctive attributes are. Examples include distinguishing faces or recognising speech. These types of AI applications can also learn how to become a team player by predicting how others will behave, by developing classic collaborative strategies and by developing new strategies themselves[10].

Good machine learning and deep learning algorithms rely on vast amounts of data. In general, the performance of the model improves as more data becomes available.

Value for higher education

AI offers many opportunities for the various levels of our education[2,11,12]. In this section, we describe a number of general possibilities; see the Appendix for specific examples at the course and tool levels.

At the institutional level, AI applications can be used for:

- Logistic processes, such as putting together workable timetables for study programmes and examinations.
- Service processes, such as making information available to students via chatbots.
- Enabling (lifelong) learning independent of place and time.
- Improving equal opportunities and increasing inclusiveness.
- Selecting open educational resources.
- Improving the way knowledge is tested, for example, in the form of exams that can be sat at a time and place of the candidate's own choosing, or the analysis of education data (learning analytics).
- Strategic HRM thanks to HR analytics and a contribution to the teacher shortage.
- Quality assurance.

At the level of individual study programmes, AI can be used to:

- Provide support with reviewing, assessing and giving feedback.
- Increase the effectiveness of digital learning resources, in particular in synergy with other technologies, such as VR and serious games. This can be achieved, for instance, by:
  - Personalised feedback, feed-up and feed-forward;
  - Activating teaching methods;
  - Increasing student engagement.
- Combatting fraud, for example, by using online proctoring or plagiarism detection. This includes the possible misuse of AI by students, for example, by having their essays, theses or other writing assignments automatically generated.
- Supporting tasks, including administrative tasks, helping to reduce the workload of lecturers.

At the individual course level, for example, AI can be used to:

- Gain insight into the quality of instruction and the learning process of students, for example, by supporting the lecturer with holistic, substantiated insights (learning analytics).
- Personalised learning: ensuring that teaching better meets the expectations of students, with both better outcomes and a better learning process.
- Give students more insight into their own learning process.
- Give students the opportunity to study anywhere they like, at any time they like.

Risks and ethical considerations when using AI

AI applications can offer great value to higher education, but they also come with risks. Algorithms and data may contain bias, and this can cause unintended exclusion. The data would then be unrepresentative and contain certain biases. As a lecturer, you cannot always judge how an AI application works, but you must be able to take responsibility for any decision taken using this application[13,14].

Bias

Berendt, Littlejohn & Blakemore[15] describe three problems underlying the emergence of bias and misinterpretation of data. First of all, bias may already be included in the algorithms used. This bias, such as gender or ethnicity bias, can reinforce itself (undetected) or ensure that existing inequalities are maintained. Secondly, the ongoing analysis of data from individual students could become a slippery slope, leading to more sinister forms of data collection by institutions or governments. Thirdly, there is a risk that AI systems will be granted such extensive decision-making powers that they will have an undesirably outsized influence on the lives of users. This would be the case, for example, if data on students' school performance would lead to automated choices about jobs or further education.

The authors argue that these problems, within the often-mandatory nature of education within educational institutions, could lead to violations of human rights or restrictions on the freedoms of individual students or teachers. They therefore argue in favour of allowing users to opt out within this context. More generally, they argue that if AI is used in the education system, it should be students and lecturers who should benefit most from it, rather than education organisations and companies.

Ethical considerations

The biggest challenge with AI is therefore perhaps to develop and use applications in an acceptable and ethically responsible way[6.16]. By this, we mean with respect for human values, for the natural environment and the future of our planet, and mindful of vulnerable groups such as children, people with disabilities or people at risk of exclusion. Transparency about policies and communications concerning AI applications is also crucial: why were certain choices made? What considerations have been made?

SURF and Kennisnet have developed a framework of values that contains values that are important in the conversation about the digital transformation in education and research[17]. The three basic values – justice, humanity and autonomy – are further elaborated in this values framework (see Figure 2).

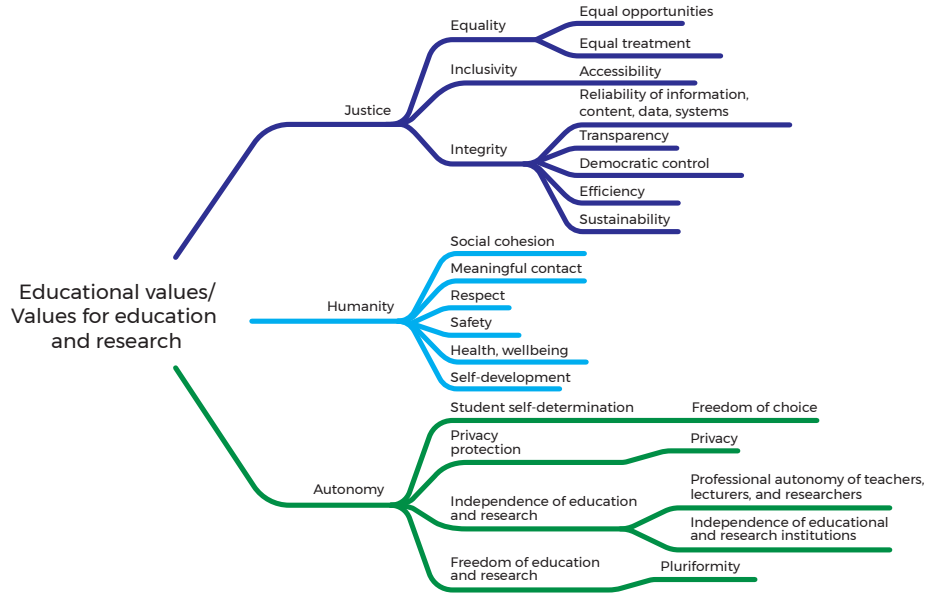


Figure 2 Values framework for education and research[17(p2)]

This framework of values, as part of an assessment framework, could form the basis for the responsible use of algorithms and the starting point for discussions on the control and supervision of algorithms[18]. The following aspects of an AI application must be known:

- Data: overview of the primary datasets used in the development and application of the algorithm.
- Data processing: how does the system use the data?
- Combating unequal treatment: how does the algorithm work to enforce equal treatment or does it combat unequal treatment?
- Human oversight: To what extent do humans oversee the operation of the algorithm?
- Risks and assurances: what risks does the use of the algorithm entail and what does the institution do to mitigate these risks?

The answers to these questions will provide more transparency and afford you a better grasp of algorithms. Transparency must also be the rule, not the exception, because we use algorithms to support human action[a].

[a] The SIG AI in Education is currently in discussions with SURF on the development of an AI register, which will make it possible to ensure that algorithms used in AI applications in the education sector are transparent.

Examples of AI and the degree of control

There are already some examples of AI being used in teaching. Figure 3 provides an overview based on the description of Holmes et al.[9]. The Appendix contains practical examples of AI being used in higher education, including various tools and programmes.

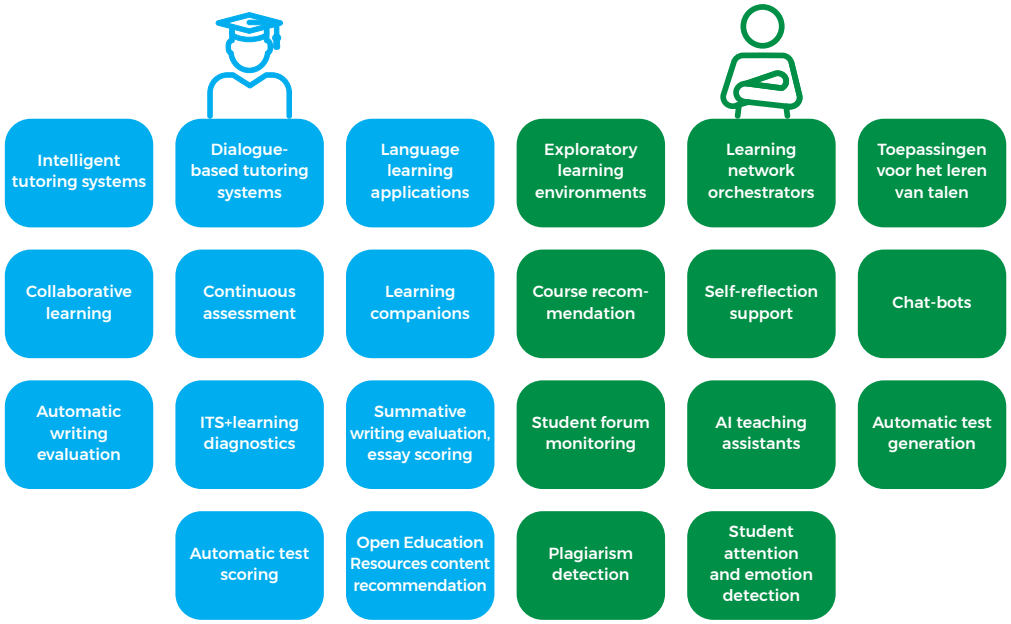


Figure 3 Overview of possible applications of AI in teaching (based on Holmes[9]).

These AI examples take over the control the lecturer has over the teaching to a greater or lesser extent. In a personalised learning model, Molenaar[19] demonstrates, based on six automation levels, how hybrid human-AI solutions combine the strengths of human and artificial intelligence to achieve personal learning (see Figure 4).

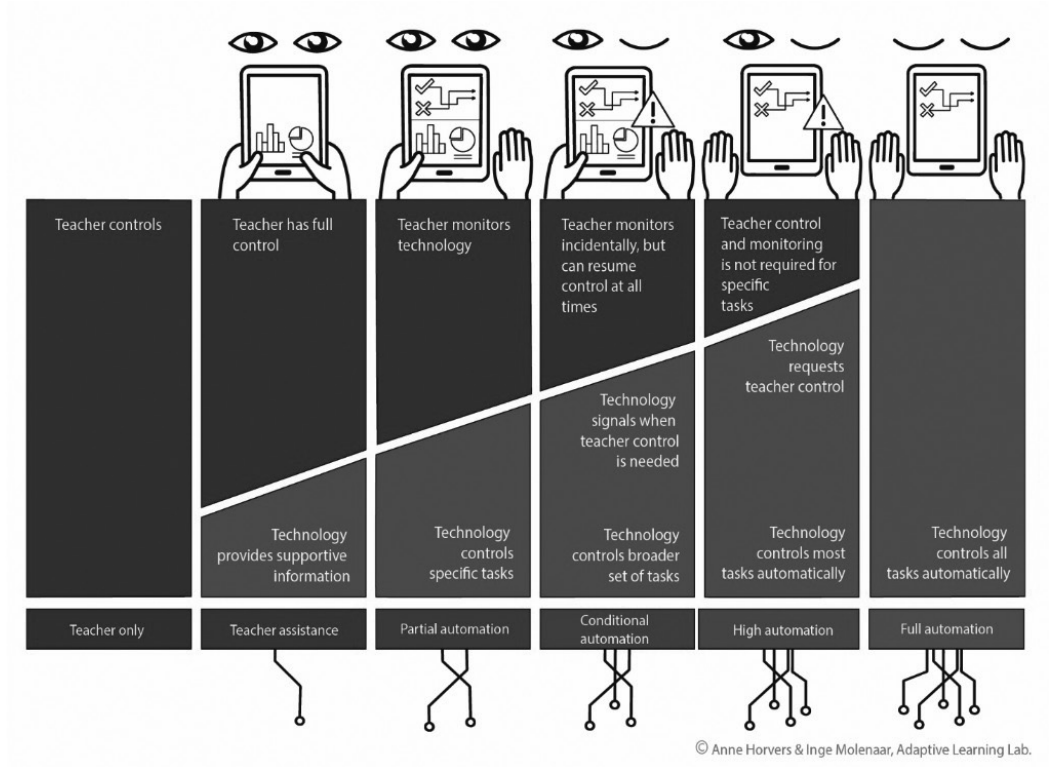


Figure 4 Six levels of automation in a personalised learning model[19]

Hhe model explains the distribution of roles between AI and the lecturer. You can use it to interpret the position of AI in different contexts. What is more, the model also help guide conversations surrounding the desirability of the various scenarios. The model can be applied at various levels ranging from micro to macro. The micro level can be as small as a single task (e.g. giving feedback), while the macro level can be as large as an entire study programme or even "learning" itself. The model can also help us to understand the gap between the state of the art and the day-to-day use of technologies in schools from the perspective of human control.

Finally - smart education

Education continues to grow into a rich learning environment offering smart tools. Lecturers are intelligently supported in the performance of their tasks and students are intelligently advised on the next step on their personal learning pathway. When developing and applying AI applications, one of the major challenges we face is to always assess whether what we are doing is ethically responsible. In addition, the use of AI tools for teaching also poses

a challenge: we don't want a situation where AI-based support of lecturers essentially means that all the work is delegated to the AI systems. The ultimate goal is to strike a balance between lecturers, students and AI, where the quality of learning is the linchpin.

Target group

This field lab is aimed at lecturers in higher education (research universities or universities of applied sciences) who want to deepen their knowledge of AI and its possible applications. Extensive prior knowledge about the theme is not required; the program offers a preparation module to increase prior knowledge in the field of AI (see also the section Content and format). Some affinity with teaching and designing education and/or developing digital applications is desirable. During the hackathon, it is recommended to work in multidisciplinary teams of 6-8 people. Make sure the team is made up of people with different expertise, such as educational designers or technicians. The open nature of the field lab offers the space to adapt the content to the needs and experiences of the lecturers.

Preconditions

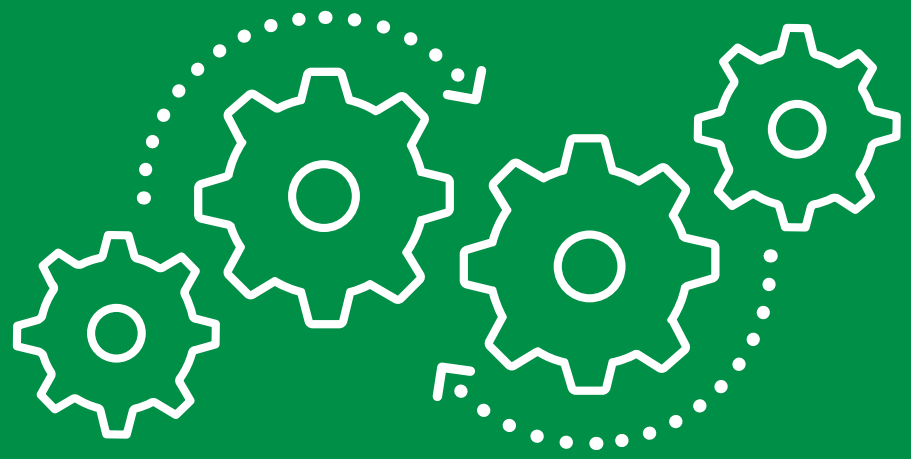
In order to implement this field lab, the participating institution must provide a facilitator who is dedicated to the process throughout its lifetime. The facilitator is responsible for planning and organising the hackathon. He or she is the first contact person for participating lecturers.

To fulfil this role, we recommend appointing a facilitator who:

- (depending on the size of the hackathon chosen), is at least 40 hours available for organizing the hackathon;
- has experience in the working method of a hackathon;
- has experience in supervising the learning process of adult lecturers;
- is able to maintain a balance between deep learning and goal-oriented work;
- is aware of basic principles of both teaching design and teaching practice;
- has affinity with IT in education and (somewhat) the theme of AI.

We also recommend making a physical or digital workspace available.

Hackathon entries must not contain any third party trademarks, copyrighted music or other material unless the participant has permission to use such material. Entries must be the original work of the entrant, be the sole property of the entrant, and not infringe the IP rights of any other person or entity.



Practical design

This work package presents a set-up that can be used by educational institutions to organise their own hackathon. A hackathon can be described as a design competition in which teams of participants compete against each other, devising a solution to a presented problem.

In the case of this field lab, participants prepare by studying the resources contained in the preparation module, before they move on to solve a practical case study concerning AI in higher education. In this way, they learn the basics of artificial intelligence, and are challenged to do so in the context of their own working environment.

The structure described in the following paragraphs is derived from the experience gained by the project group during the preparation of the '*Hackathon AI in higher education*', which took place on 17 & 18 June 2021. This event saw teams from four educational institutions participate against the backdrop of the Month of Artificial Intelligence. The supervised part spanned two half-days. But the teams also worked independently during the evenings. This manual is the result of the programme of this hackathon, combined with the experiences of the project group. It is also important to note that the hackathon that was organised on 17 and 18 June can be regarded as the 'most comprehensive' version. The manual set out on the following pages assumes a basic structure to which elements can be added, depending on the specific needs of the organising institution. The elements are as follows:

Basic structure
- Preparation module
- Design contest (the actual hackathon)
- Group presentations

Additional elements
- Deployment of Jedis
- Building a proof of concept using SURF SARA
- Judging
- Pizza budget

The following paragraphs first describe the basic structure. We then describe the additional modules that can be bolted onto the basic structure in order to achieve the full scope of *Hackathon AI in higher education*. In this way, institutions can decide for themselves what elements they need, and what resources in the form of time they want to make

available for the hackathon. The learning objectives relevant to this field lab are described in the following paragraph.

Learning objectives

On conclusion of the (full) preparation module, lecturers will be able to:

1. indicate the scope of the theme AI.
2. calculate with basic principles of probability calculation, problem solving and search strategies in AI applications.
3. recognize risks of AI applications.

After participating in the hackathon, lecturers will be able to:

4. Design a proof-of-concept of an AI application, taking into account the level of control, the risks and the relevant ethical considerations.

The following success criteria have been formulated for each learning objective.

1. The lecturer will be able to indicate the scope of the theme AI.
- The lecturer can describe the history and origins of AI.
- The lecturer can mention the main features of AI.
- The lecturer can explain the two AI techniques: machine learning and deep learning.
- The lecturer can give some examples of AI within and outside the context of higher education.
- The lecturer can articulate the added value of AI for different levels of higher education.
- The lecturer can describe a number of AI platforms and their core properties.

2. The lecturer will be able to calculate with basic principles of probability calculation, problem solving and search strategies in AI applications.
- The lecturer can describe a real problem as a search problem.
- The lecturer can formulate a simple game as a game tree.
- The lecturer uses the minimax principle to discover the best moves in a game tree of limited size.
- The lecturer can express probabilities in terms of natural frequencies.
- The lecturer can apply Bayes' rule to infer risks in simple scenarios.

3. The lecturer will be able to recognize risks of AI applications.
- The lecturer can indicate the degree of control by tool and user within an AI application.
- The lecturer can recognize risks related to algorithmic bias.
- The lecturer can recognize privacy risks.
- The lecturer can use the value framework for education and research for ethical considerations.

4. The lecturer will be able to design a proof-of-concept of an AI application.
- The lecturer can analyse a problem in a given case.
- The lecturer can deliberately select a suitable AI application for the problem.
- The lecturer can substantiate his choices regarding the AI application.
- The lecturer develops a prototype (proof-of-concept) of an AI application.*
- The lecturer can present a proof-of-concept in a public-friendly way.*
- The lecturer can reflect on the proof-of-concept with regard to the level of control, the risks and the relevant ethical considerations.*

*These learning objectives and success criteria only apply when the proof-of-concept module is used.

Design

The following building blocks relating to the characteristics of professional development have been used for this field lab[20]:

- Active learning: In the hackathon, lecturers will actively use the knowledge gained in the preparation module.
- Clearly defined goals: Clear and measurable learning goals and success criteria have been formulated.
- Collaborative learning: Lecturers work together in multidisciplinary teams during the hackathon.
- Ethics: Both the preparation module and the hackathon pay explicit attention to the ethical risks of AI applications.
- Expert-supported PD: During the hackathon, facilitators are present who can advise on solving the case (when using the extended module *Deployment of Jedi's*).
- Technological knowledge: In the hackathon, lecturers learn to substantiate why a particular AI application leads to the desired educational outcomes.
- Use of technology: The preparation module consists of digital components and the hackathon takes place online, using a digital platform.

The following building blocks relating to lecturer characteristics have been used in this field lab[20]:

- IT literacy: During the hackathon, lecturers acquire skills related to AI platforms or tools and are guided in this by experts.
- Motivation: The hackathon contains a competitive element where teams compete against each other.
- Prior knowledge: The preparation module contains a general part for all lecturers and an optional part for lecturers with limited knowledge of the AI theme.

Basic structure for an AI hackathon
The basic structure for the hackathon consists of three elements: the **preparation module**, the **hackathon** itself and the **team pitches**. Participants prepare for the hackathon individually or in teams by studying a preparation module, giving them the foundational knowledge they will need to get started. At the start of the hackathon, a problem faced in teaching practice is presented, and participants will then try to devise a solution to this problem throughout the programme. The following paragraphs provide a description of these three elements as well as a step-by-step plan to help you organise the basic structure of the hackathon.

Basic structure: Preparation module
Participants ready themselves for the hackathon by following a preparation module. The preparation module can be found on this website but also in Appendix A.
After following this module:
- Participants will know what Artificial Intelligence is and will be able to pinpoint a number of examples of AI within the higher education context but also outside;
- Participants will be familiar with the basic principles of probability, problem-solving and search strategies behind AI applications;
- Participants will be familiar with a number of AI platforms and will be able to describe their core characteristics;
- Participants will be able to explain what risks AI applications may pose in terms of algorithmic bias and privacy issues;
- Participants will be aware of the degree of control exercised by the tool and the user within an AI application

The preparation module contains two tracks: the mandatory route, which takes about 3 hours to complete, and the optional route, which takes about 40 minutes. Participants choose their route based on their own prior knowledge. The whole things consists of a number of documents, websites and videos.

Basic structure: Hackathon
The hackathon kicks off with an introduction session, followed by a presentation of the problem. Institutions are free to devise their own practical problem, or to use the same practical problem that was presented during the hackathon on 17 and 18 June:

We know that students' motivation is influenced by the elements of autonomy, social cohesion and competence. Create an AI application that has a positive impact on one or more of these elements within your educational context.

Participants work together and devise an AI application that solves the practical problem. They follow various steps that guide them through the following components:

Component 1: The educational principle
Component 2: Ethical aspects and degree of control
Component 3: The concept
Component 4: Preparation for the pitch

The steps are explained in the assignment description, which can be found in Appendix B. Throughout the programme, the teams are asked several times to report on their progress and talk about what they are working on. It takes about 4 hours to complete these steps.

Basic structure: Group pitches
Once the teams have completed the hackathon, they give each other extensive feedback on their deliverables and the choices they made to transition from idea to concept. In the final steps of the hackathon, they were asked to prepare a 10-minute pitch explaining the following aspects:
- The educational principle and the choices that are relevant to it (elaboration of component 1).
- A reflection on the 'ethical elegance' and the degree of control of your AI application (elaboration of component 2).
- A description of how you went in four steps from idea to proof of concept (elaboration of component 3)

Calculate the duration of the group pitches by multiplying the number of participating teams by 10 minutes.

Organising the basic structure

To organise the basic structure described above, we recommended you follow this step-by-step plan:

Preparation for the hackathon		
Step:	***What?***	***When?***
Host	Name one or more hosts who will present the programme and ask the teams for feedback throughout the hackathon. Ask the hosts to study the programme below, and to think about how to complete the various components.	Before the hackathon
Dates and venue	Plan a time when the hackathon will take place, and reserve a space providing sufficient opportunity for the teams to collaborate (online).	Before the hackathon
Invite participants	Invite participants and ask them to enrol with a team of about 6 to 8 people. It is recommended to build teams consisting of participants with educational experience and participants with an affinity for software development.	At least 6 weeks before the hack-athon.
Participant information email	Send the enrolled participants an email with general information, a description of the activities and the link to the preparation module. Use the standard emails provided in Appendix C to help you.	6 weeks before the hackathon
(Where applicable) SURF pre-briefing for Jupyter Notebooks	Schedule an appointment with SURF to discuss setting up the Jupyter Notebooks (only where relevant).	4 weeks before the hackathon
Remind participants	Send the participants another email reminding them to complete the preparation module.	1 week before the hackathon

The following programme can then be followed throughout the event:

Programme for the hackathon		
Time (duration):	***Component:***	***What?***
‘0:00 – ‘0:15	Welcome and introduction	The host welcomes the participants. The host explains the topic of AI in higher education, specifically in the framework and context of the institution.
‘0:15 – ‘0:25	Assignment & practical problem	The host presents the various steps of the hackathon, and the practical problem is revealed.
‘0:25 – ‘0:30	Questions and kick-off	There is a brief opportunity to ask questions. The hackathon will then get underway.
‘0:30 – ‘1:15	Team activities 1	The teams work on the steps described in Component 1: *Educational principle*.
‘1:10 – ‘1:15	Brief feedback 1	
‘1:15 – ‘1:55	Team activities 2	The teams work on the steps described in Component 2: *Ethical aspects and degree of control*
‘1:55 – ‘2:00	Brief feedback 1	
‘2:00 – ‘2:55	Team activities 3	The teams work on the steps described in Component 3: *The concept*
‘2:55 – ‘3:00	Brief feedback 3	
‘3:00 – ‘4:00	Team activities 4	The teams work on the steps described in Component 4: Preparation for the pitch.
4:00 - ….	Team pitches	The teams present the fruits of their labours.

Expansion module: Deployment of Jedis
Jedis ensure that the teams make progress in their development process: these are individuals with a wealth of experience in the field who help the teams hands-on with the development of their ideas. Jedis can help with design issues, but they can also provide technical assistance. This will be the case in particular if you also decide to follow the expansion module: Building a proof of concept using SURF SARA.

Jedis can be recruited from among the lecturer or student populations. During the hackathon on 17 and 18 June, a team of Jedis was successfully deployed. The team was made up of lecturers (from Rotterdam University of Applied Sciences) and students (from TU Delft). Use the email samples in Appendix D to help you recruit your team of Jedis.

Adding this module to the programme will not necessarily take any extra time. However, it is advisable to coordinate your deployment of Jedis throughout the programme so that teams with questions can be helped quickly. You may also provide each team with their own Jedi.

Expansion module: Building a proof of concept using SURF SARA
It is also possible to make real progress towards the creation of an AI application during the hackathon. This gives the programme a heavier and more realistic character, because teams not only work on conceptualisation, but also turn that idea into a proof of concept: A working prototype of the AI application which they can then use to demonstrate that the functionality they have in mind can actually be implemented.

This can be achieved in many different ways. For example, an institution could create an IT landscape in which the teams can work on their proof of concept, or it could use a platform such as ANACONDA.

Subject to certain conditions, it is also possible to use Jupyter Notebooks that can be set up in a SURF cluster. In that case, participants need only log in to gain access to the necessary applications. There are costs associated with the use of this service. For more information, interested institutions can contact SURF's helpdesk (servicedesk.surfsara.nl, log in, click on 'Helpdesk' and select service/system 'Jupyter (on Lisa)').

All the above methods aim to create a landscape in which the participants can use the following (open source) tools:
- Python 3.8 (pip3 install package manager)
- Keras
- TensorFlow 2
- PyTorch 1.8.1
- Scikit-learn

These tools enable the participants to develop the additional components around the proof of concept as detailed in the description of the assignment set out in Appendix B. We advise institutions that wish to make use of this expansion module to always do so in combination with the deployment of Jedis and expertise in this field from within the institution or from outside. This Github page provides instructions for the Jedis for inspiration or use (in Dutch).

Adding this module will require an extension of the programme of at least two hours. You could also consider planning the programme across two dates and providing the opportunity to work on the proof of concept in between the two dates. During the hackathon on 17 and 18 June, the participants worked late into the evening (some even worked into the small hours).

Adding this module will enable participants to achieve the final two success criteria of learning objective 4.

Expansion module: Judging
To ensure that the pitches have a formal character, institutions may choose to appoint a jury to make the assessments. A jury is there to not only evaluate the pitches, but also to signify the importance of a particular concept for the organisation.

We recommend that the jury be composed of experts in *AI at the conceptual level*, *AI at the technical level and Design and implementation of education*. Use the assessment form provided in Appendix E for the assessment. A basis for an instruction text for the jury members can be found in Appendix F.

Adding this module will extend the time needed for the programme. Add about five minutes per pitch for the jury's deliberations, and another five minutes for some brief feedback on each pitch.

Expansion module: Pizza budget
In order to give the event a real hackathon feel, you can choose to provide a *pizza budget*. Especially when participants will be working on their proof of concept late into the evening, this can help to ensure people enrol, but will also help to keep the team's morale high.

It goes without saying, though, you do not have to be spend the *pizza budget* on pizza. During the hackathon on 17 and 18 June, all participants were offered a small budget for a meal order.

And finally
Using the components above and the resources in the appendix, it is possible to put together a programme for a hackathon that will meet the specific requirements that an institution has. But it will sometimes be necessary to make tailor the resources. The texts provided in the appendix should be taken as tools that provide a basis for ongoing development of resources by the institutions. The programme and the details of the various programme components are purely indicative. We gladly invite institutions to use this work package as a launchpad for developing their own flavour of the hackathon:
AI in higher education.

Evaluation

The Facilitating professional development for lecturers zone of the Acceleration Plan would like to hear about your experiences, and we are therefore asking lecturers participating in the field lab to fill in a questionnaire. We use the results to improve the field lab and to help inspire other higher education institutions. The results of the evaluation will be shared on our website at www.versnellingsplan.nl/english. These results will be regularly updated as soon as new data is available.

Who is it for?
There are two different questionnaires:
1. a questionnaire for the facilitator(s)
2. a questionnaire for the lecturers.

When?
Facilitator(s) and lecturers should complete the questionnaire at the end of the hackathon.

How?
The questionnaire can be completed online. The links and QR codes are shown below.

If you have any questions, please send an e-mail to the researchers of the Facilitating Professional Development for Lecturers zone:
Dorien Hopster-den Otter, d.denotter@utwente.nl
Marlies ter Beek, m.terbeek@utwente.nl

Questionnaire facilitator
in Dutch
The Dutch questionnaire for the facilitator can be found here:
Or use this QR-code:

Questionnaire facilitator
in English
The English questionnaire for the facilitator can be found here:
Or use this QR-code:

Questionnaire lecturers
in Dutch
The Dutch questionnaire for the lecturers can be found here:
Or use this QR-code:

Questionnaire lecturers
in English
The English questionnaire for the lecturers can be found here:
Or use this QR-code:

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Appendix

Practical examples of AI in education

- AI in **formative assessment**: an AI application that automatically provides feedback, groups students together, and/or provides students with revision or in-depth resources. But also dashboards that provide lecturers with a number of action options, for instance.
- Online **proctoring**, where AI identifies certain behaviour as suspicious and flags up the student.
- AI can help lecturers to find and integrate open educational resources in their lectures. **Smart search technology** can help secure access to open educational resources and other relevant information. In addition, AI can enrich the materials found with suggestions on how best to use them or other information, so that lecturers can easily integrate them into their teaching.
- Automated **feedback on writing assignments**. AI applications can 'recognise' well-written texts and compare them with submissions from students.
- AI can act as an **interactive tutor**[21] that supports the step-by-step development of simple functional programmes. This tutor means students will receive feedback on whether they are on the right track or not, or they can ask for a nudge if they get stuck, and receive suggestions on how they can restructure their programme.

Specifieke AI-programma's en/of -tools

- Pounce is an SMS-based **AI conversation interface** from Georgia State University, customised to process interactions with specific student enrolment tasks, such as processing tuition fees, completing a loan application and understanding guidelines for having pets in the dormitories.
- ACAwriter offers automated **feedback on writing assignments**. The program recognises not only formal assignments, but also 'moves' that you can link to a text. Move sets are developed for specific domains.
- Perusall provides automated feedback on texts during close reading. It is a social system in which students work together to take notes. Some students may want to be the first to ask questions based on a text, while others may enjoy answering questions or responding to fellow students. The lecturer will see the annotations in advance, making it possible to choose good annotations from students who are normally too shy to speak up in the classroom. By rewarding these annotations, it is possible to encourage more students than usual to participate in **classroom discussions**.
- Grasple is **a personalised learning platform** for statistics, mathematics, research methods and linear algebra. As with other personalised platforms, it is built around a building block approach to learning, with small learning objectives that are assessed before a user can move on. Positive and negative feedback loops enable students to navigate

through the concepts in a seemingly linear progression (although the subject map actually more closely resembles a network). 6bit education can be used in addition to Grasple, to obtain automated feedback on mathematics assignments.

- Comproved is a comparison tool designed to assess students comparatively. **Comparative assessment** is the most effective method of measuring complex skills and encouraging development. You can deploy this tool to judge 'most beautiful photos' but also to judge reports. This allows you to outsource the assessment of reports. Even people who are not entirely familiar with the subject matter will still be able to make an appropriate assessment.
- Labster is a digital laboratory for **conducting experiments online**. The application offers a growing set of online simulations for simple but also more complex laboratory studies, which are well-substantiated in terms of didactics. VR technology is also used.
- Resoomer automatically produces a **summary** based on a text, provided it has a certain argumentative structure and layout.
- Sense is an AI application for providing **feedback**. As a lecturer, you can see how unique the student's input is and give feedback back to groups.
- Genie is a **chatbot** and personal assistant developed by Deakin University. Genie combines various sources of information from the university and can also make **personalised suggestions**.
- Edia Papyrus automatically provides **metadata** and automatically **classifies** teaching resources.

The Acceleration Plan for Educational Innovation with ICT is a four-year programme focused on bringing initiatives, knowledge, and experiences for digitalisation together. The programme is an initiative of SURF, the Netherlands Association of Universities of Applied Sciences, and the Association of Universities, and is organised in eight acceleration zones. In the zone Facilitating professional development for lecturers, 18 institutions are working on improving the professional development of lecturers in Dutch higher education.

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